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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/939,327	08/24/2001	Mingqi Zhao		3869

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Ms. Virginia Griffith  
1288 Pear Avenue  
Mountain View, CA 94043

EXAMINER

DIAMOND, ALAN D

ART UNIT	PAPER NUMBER
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1753

DATE MAILED: 11/24/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/939,327

Applicant(s)

ZHAO ET AL.

Examiner

Alan Diamond

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 9/14/2004, 8/16/2004, and 7/1/2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-5, 8-10, 14-18, 21, 22, are 25-29 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5, 8-10, 14-18, 21, 22, are 25-29 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 December 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)               | Paper No(s)/Mail Date. _____  |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>09162004, 07182002</u>  | 6) <input type="checkbox"/> Other: _____                                    |

## DETAILED ACTION

### *Comments*

1. The amendment to the specification filed July 1, 2004 sets forth incorrect paragraph numbers. Paragraph number "0079" on page 2 of said amendment should be changed to paragraph number "0078". Paragraph numbers "0096", "0097", and "0098" on pages 2-3 of said amendment should be changed to paragraph numbers "0095", "0096", and "0097", respectively. Paragraph numbers "00100" and "00101" on pages 3 and 4 of said amendment should be changed to paragraph numbers "0099" and "00100", respectively. Paragraph number "00110" on page 4 of said amendment should be changed to paragraph number "00109". On page 5 of said amendment, paragraph number "0146" should be changed to "00146". Furthermore, bridging pages 4 and 5 of said amendment, the material: "(FIGS. 19A and 19B corresponding to metallic heaters and FIGS. 20A to 21C corresponding to ink heaters)" is newly added material by the amendment that needs to be underlined. It is requested that Applicant send in an amendment to the specification with all of the above changes. Applicant's amendment to the specification takes care of the objections to the drawings in paragraphs 1-4 of the Office action mailed 04/14/2004. However, in order to make the record clear and complete, the above changes to the amendment need to be made.
2. The rejection of the claims under 35 USC 112, second paragraph, has been overcome by Applicant's amendment of the claims.
3. The 35 USC 103(a) rejections over Bentsen et al, the Bjornson et al references, and Hu et al, each taken individually, have been overcome by Applicant's amendment

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of claim 1 so as to require a driving electrode comprised of an electrically conducting silver/silver chloride ink pattern, and Applicant's amendment of claim 25 so as to require that at least one driving electrode has a surface comprising silver and silver chloride.

***Information Disclosure Statement***

4. Accompanying the instant final Office action is a copy of page 4 of the Form-1449 from the IDS filed July 18, 2002. The Examiner had inadvertently left out his initials for reference number 80 on said page 4. Said reference number 80 is now initialed.

***Claim Rejections - 35 USC § 112***

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 5, 10, 28, and 29 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 5, at line 2, the newly added language "selected from the group of" is improper Markush language and should be changed to "selected from the group consisting of".

In claim 10, at line 2, the newly added language "selected from the group of" is improper Markush language and should be changed to "selected from the group consisting of".

Claim 28 is now indefinite because "the ink" at line 1 lacks positive antecedent support in claim 25. It is suggested that claim 28 be amended so as to depend from claim 26.

Claim 29 is now indefinite because "the ink" at line 1 lacks positive antecedent support in claim 25. It is suggested that claim 29 be amended so as to depend from claim 26.

***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 1-5, 8-10, 14-18, 21, 22, are 25-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bentsen et al (U.S. Patent 6,375,871), in view of Guy et al (U.S. Patent 5,362,307) and Chan (U.S. Patent 5,565,143).

Bentsen et al teaches a microfluidic device having a cover (70), a substrate (68), a fluid reservoir (74), a microchannel (38), and a conductive circuit trace (78) on the cover (70) so that when a material is present in the reservoir, the conductive circuit trace (78) makes electrical contact with the material in the channel and reservoir (see Figures 9a and 9b; and col. 10, line 47 through col. 11, line 9). Said trace can be made from conductive silver-filled inks (see the paragraph bridging cols. 10 and 11). The device can be used for analyzing or otherwise manipulating biological fluid samples

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(see col. 1, lines 10-16). Bentsen et al teaches the limitations of the instant claims other than the difference which is discussed below.

Bentsen et al does not specifically teach the use of a silver/silver chloride ink for its conductive ink that serves as the trace (78), i.e., as the driving electrode. However, as shown by Guy et al, it is well-known that silver/silver chloride electrodes can be used as driving electrodes (see col. 20, lines 16-38, of Guy et al). Additionally, silver/silver chloride inks are well-known in the art, and can be water-based so as to provide for reduced volatile organic compound emission, as shown by Chan (see col. 1, line 12 through col. 2, line 42 of Chan). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a silver/silver chloride ink for Bentsen et al's conductive ink trace (78) because silver/silver chloride can be used as a driving electrode, as shown by Guy et al, and because silver/silver chloride conductive inks are conventional in the art and provide the advantage of being water-based thus reducing volatile organic compound emission, as taught by Chan. It is the Examiner's position that bubble formation will inherently be reduced when the silver/silver chloride ink is used in Bentsen et al's device.

9. Claims 1-5, 8-10, 14-18, 21, 22, are 25-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bjornson et al (U.S. Patent 6,103,199) in view of Guy et al (U.S. Patent 5,362,307) and Chan (U.S. Patent 5,565,143).

Bjornson et al teaches the claimed microfluidic device wherein the electrodes can be made from, for example, conductive ink (see Figures 1-12; col. 1, lines 6-10; col. 7,

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line 14 through col. 8, line 40; and col. 23, lines 30-59). Bjornson et al teaches the limitations of the instant claims other than the difference which is discussed below.

Bjornson et al does not specifically teach the use of a silver/silver chloride ink for its conductive ink, i.e., as the driving electrode. However, as shown by Guy et al, it is well-known that silver/silver chloride electrodes can be used as driving electrodes (see col. 20, lines 16-38, of Guy et al). Additionally, silver/silver chloride inks are well-known in the art, and can be water-based so as to provide for reduced volatile organic compound emission, as shown by Chan (see col. 1, line 12 through col. 2, line 42 of Chan). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a silver/silver chloride ink for Bjornson et al's conductive ink because silver/silver chloride can be used as a driving electrode, as shown by Guy et al, and because silver/silver chloride conductive inks are conventional in the art and provide the advantage of being water-based thus reducing volatile organic compound emission, as taught by Chan. It is the Examiner's position that bubble formation will inherently be reduced when the silver/silver chloride is used in Bjornson et al's device.

10. Claims 1-5, 8-10, 14-18, 21, 22, are 25-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hu et al (U.S. Patent 6,623,860) in view of Guy et al (U.S. Patent 5,362,307) and Chan (U.S. Patent 5,565,143). The instant claims are not fully supported by provisional application 60/233,838, and thus, have a filing date of August 24, 2001. The material in Hu et al referred to below is fully supported by provisional application 60/239,305 and thus, has a filing date of October 10, 2000.

Hu et al teaches the claimed microfluidic device wherein the electrodes can be made from, for example, conductive ink (see Figures 1A-1C; col. 1, lines 16-27; col. 8, lines 51-63; and col. 12, line 38-col. 13, line 12). Hu et al teaches the limitations of the instant claims other than the difference which is discussed below.

Hu et al does not specifically teach the use of a silver/silver chloride ink for its conductive ink, i.e., as the driving electrode. However, as shown by Guy et al, it is well-known that silver/silver chloride electrodes can be used as driving electrodes (see col. 20, lines 16-38, of Guy et al). Additionally, silver/silver chloride inks are well-known in the art, and can be water-based so as to provide for reduced volatile organic compound emission, as shown by Chan (see col. 1, line 12 through col. 2, line 42 of Chan). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a silver/silver chloride ink for Hu et al's conductive ink because silver/silver chloride can be used as a driving electrode, as shown by Guy et al, and because silver/silver chloride conductive inks are conventional in the art and provide the advantage of being water-based thus reducing volatile organic compound emission, as taught by Chan. It is the Examiner's position that bubble formation will inherently be reduced when the silver/silver chloride is used in Hu et al's device.

11. Claims 1-5, 8-10, 14-18, 21, 22, are 25-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bjornson et al (U.S. Patent 6,284,113) in view of Guy et al (U.S. Patent 5,362,307) and Chan (U.S. Patent 5,565,143).

Bjornson et al teaches the claimed microfluidic device wherein the electrodes can be made from, for example, conductive ink (see Figures 1-3, 16, and 17; col. 1, lines 10-



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18; col. 11, lines 26-52; col. 15, line 14 through col. 16, line 11; and col. 23, lines 42-65).

Bjornson et al teaches the limitations of the instant claims other than the difference which is discussed below.

Bjornson et al does not specifically teach the use of a silver/silver chloride ink for its conductive ink, i.e., as the driving electrode. However, as shown by Guy et al, it is well-known that silver/silver chloride electrodes can be used as driving electrodes (see col. 20, lines 16-38, of Guy et al). Additionally, silver/silver chloride inks are well-known in the art, and can be water-based so as to provide for reduced volatile organic compound emission, as shown by Chan (see col. 1, line 12 through col. 2, line 42 of Chan). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a silver/silver chloride ink for Bjornson et al's conductive ink because silver/silver chloride can be used as a driving electrode, as shown by Guy et al, and because silver/silver chloride conductive inks are conventional in the art and provide the advantage of being water-based thus reducing volatile organic compound emission, as taught by Chan. It is the Examiner's position that bubble formation will inherently be reduced when the silver/silver chloride is used in Bjornson et al's device.

12. Claims 1-5, 8-10, 14-18, 21, 22, are 25-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bjornson et al (U.S. Patent Application Publication 2002/0092767) in view of Guy et al (U.S. Patent 5,362,307) and Chan (U.S. Patent 5,565,143). The instant claims are not fully supported by provisional application

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60/233,838, and thus, have a filing date of August 24, 2001. Bjornson et al has a continuity date at least back to April 25, 2000.

Bjornson et al teaches the claimed microfluidic device wherein the electrodes can be made from, for example, conductive ink (see Figures 1-9; and paragraphs 0009, 0035, and 0057). Bjornson et al teaches the limitations of the instant claims other than the difference which is discussed below.

Bjornson et al does not specifically teach the use of a silver/silver chloride ink for its conductive ink, i.e., as the driving electrode. However, as shown by Guy et al, it is well-known that silver/silver chloride electrodes can be used as driving electrodes (see col. 20, lines 16-38, of Guy et al). Additionally, silver/silver chloride inks are well-known in the art, and can be water-based so as to provide for reduced volatile organic compound emission, as shown by Chan (see col. 1, line 12 through col. 2, line 42 of Chan). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a silver/silver chloride ink for Bjornson et al's conductive ink because silver/silver chloride can be used as a driving electrode, as shown by Guy et al, and because silver/silver chloride conductive inks are conventional in the art and provide the advantage of being water-based thus reducing volatile organic compound emission, as taught by Chan. It is the Examiner's position that bubble formation will inherently be reduced when the silver/silver chloride is used in Bjornson et al's device.

### ***Response to Arguments***

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13. Applicant's arguments filed July 1, 2004 and August 16, 2004 have been fully considered but they are not persuasive.

Applicant argues that none of Bentsen et al, Hu et al, or the Bjornson et al references teaches or suggests forming their electrodes from silver/silver chloride, and that silver/silver chloride is typically used as either a reference electrode or a counter electrode in low voltage/low current applications. However, this argument is not deemed to be persuasive because, as set forth above Bentsen et al, Hu et al, or the Bjornson et al references taken in view of Guy et al and Chan render obvious the instant claims. As shown by Guy et al, it is well-known that silver/silver chloride electrodes can be used as driving electrodes (see col. 20, lines 16-38, of Guy et al). Additionally, silver/silver chloride inks are well-known in the art, and can be water-based so as to provide for reduced volatile organic compound emission, as shown by Chan. Furthermore, nothing unexpected has been demonstrated using a silver/silver chloride electrode as compared to any of the other electrodes disclosed by Bentsen et al, Hu et al, and the Bjornson et al references.

### ***Conclusion***

14. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within

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TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alan Diamond whose telephone number is 571-272-1338. The examiner can normally be reached on Monday through Friday, 5:30 a.m. to 2:00 p.m. ET.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Alan Diamond  
November 23, 2004

Alan Diamond  
Primary Examiner  
Art Unit 1753

